

REMARKS

Summary

Claims 1-9 were pending and all of the claims were rejected in the Office action; Claims 1 and 2 have been rewritten and Claims 15-16 added. Claims 1-16 are pending after entry of this amendment.

Claim Rejections

Claims 1, 2, 7 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lin (US 6,074,767) in view of Gill (US 5,508,866), Rottmayer (US 6,201,673), Tanaka (US 5,508,833), Ohyama (US 5,699,213) and Soeya (JP 05-135531 A). Claims 3-6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lin in view of Gill, Rottmayer, Tanaka, Ohyama, Soeya and Kishi (US 6,007,643). Claim 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Lin in view of Gill, Rottmayer, Tanaka, Ohyama, and Soeya in view of Applicant's admissions.

Applicant traverses the rejections and maintains the argument regarding Gill from the previous office action. Nevertheless, Applicant has amended Claim 1 to expedite prosecution of this application. Claim 1 recites that the free magnetic layer has a ferrimagnetic structure. In the free magnetic layer, only the first free magnetic layer has recesses formed therein. None of the cited references anticipate or suggest such an arrangement.

The free magnetic layers of Lin and Gill are single layers. Rottmayer teaches a multilayer free magnetic layer. Even if Lin and Gill are able to be combined with Rottmayer, none of the references anticipate or suggest an arrangement in which the recesses in the free magnetic layer are formed only in the first free magnetic layer. Instead, the recesses would be formed through the free magnetic layer if the references were somehow combined. Nor do Tanaka, Ohyama, Soeya or any of the other cited references anticipate or suggest such an arrangement.

Furthermore, none of the references anticipate or suggest an arrangement in which a vertical bias can be applied to only the first free magnetic layer and thus, disorder of the magnetization direction in peripheral areas of the first and second free magnetic layer is mitigated. If the recesses are formed in both the first and second free magnetic layers, the magnetic field applied from the bias films at both ends of the first free magnetic layer competes with the exchange coupling magnetic field developed by the second free magnetic layer – leading to a disorder region in peripheral areas adjacent to the ends of the first and second free magnetic layers. This causes Barkhausen noise and reduces the magnetic stability of the structure.

If no recesses were formed, the vertical bias would be stronger than absolutely necessary, causing a dead region at both ends of the track and reducing sensitivity of the overall device. Formation of the recesses also permits removal of contaminants on the surface of the first free magnetic layer as recited in Claim 15 and making the ferromagnetic exchange coupling between the soft magnetic layer and the free magnetic layer stronger.

For at least these reasons, Claims 1-9 and 15-16 are patentable over the cited references.

Conclusion

For at least the reasons given above, the Applicant respectfully submits that the pending claims are allowable.

The Examiner is respectfully requested to contact the undersigned in the event that a telephone interview would expedite consideration of the application.

Respectfully submitted,



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